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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/298,306	04/23/1999	ERIC R. FOSSUM	08305/035001	1901

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EXAMINER	
TRAN, NHAN T	

ART UNIT	PAPER NUMBER
2615	

DATE MAILED: 09/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/298,306	FOSSUM ET AL.	
	Examiner	Art Unit	
	Nhan T. Tran	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-16 and 18-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-16, 18-23 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 & 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplinsky et al (US 5,822,222) in view of Hopkins (US 6,282,462).

Regarding claim 1, Kaplinsky discloses an automatic exposure adjusting device, comprising:

an image sensor having a plurality of pixels, and further having an adjustment capability (col. 2, lines 7-10; col. 10, lines 52-55);

an analog to digital converter (12 bit A/D converter) which produces digital output comprising a plurality of bits, the digital output indicative of an output of each pixel of the image sensor (col. 11, lines 1-6);

a first counter which counts a number of overexposed parts (e.g., too bright photodetectors) of the digital output; a second counter which counts a number of underexposed parts of the digital output (e.g., too dark photodetectors); a plurality of threshold detectors for comparing counting results of the first and second counters with desired thresholds (e.g., bright and dark thresholds set by user); and a decision element, which is capable of making a decision to either increase or decrease an exposure of the image sensor (by changing an integration time of the image sensor) based on a relation with thresholds (see col. 11, lines 21-42).

Kaplinsky fails to teach that the increase or decrease of the integration time is effective in a next frame of exposure since an exposure adjustment requires one frame time of latency. Hopkins teaches an improved imaging system in which exposure parameters can be changed frame-by-frame basis without the latency that is usually associated with the allocation of memory for storage of an acquired image so that a high speed control and transfer of image data is realized (see Hopkins; abstract; col. 3, lines 43-53 and col. 16, lines 4-22).

Therefore, it would have been obvious to one of ordinary skill in the art to improve the automatic exposure adjusting device in Kaplinsky in view of the teaching of Hopkins to apply any integration time adjustment to the image sensor in the next frame of exposure of the image sensor without the frame latency so that a high speed exposure control is realized.

Regarding claim 13, Kaplinsky discloses that the exposure is one of a shutter width (e.g., integration time) (see col. 11, lines 38-42).

3. Claims 2-5, 7, 8, 11, 14-16, 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplinsky et al and Hopkins as applied to claim 1 and in view of Baumeister (US 4,684,995).

Regarding claim 2, see claim 1 for combination of Kaplinsky and Hopkins. Kaplinsky teaches a coincidence detector that reviews a 12 bit digitized video signal for the exposure control (col. 11, lines 30-42). However, Kaplinsky fails to teach that the coincidence detector to review only a predetermined number of most significant bits of the digital output.

Baumeister teaches an automatic exposure control processing (32) that reviews only the most significant bits (MSB) of digital image data output from an A/D converter (24) since the most significant bits of the digital image data provide sufficient image information to determine proper exposure (see Fig. 1; col. 2, lines 52-57).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the automatic exposure control processing in combination of Kaplinsky and Hopkins by reviewing only the most significant bits (MSB) of the digital image data output from the A/D converter instead of reviewing all 12 bits since the most significant bits would provide sufficient image information to determine proper exposure and would further reduce auto-exposure processing time.

Regarding claim 3, inherent in the combinations of Kaplinsky, Hopkins and Baumeister is a number of pixels whose most significant bits include ones (logical ones) are counted since the too bright photodetectors/pixels in Kaplinsky inherently output high intensity values which correspond to logical ones in the most significant bits in digital data due to an inherent proportion between intensity values and most significant bits, i.e., the higher intensity values, the more logical ones presented in the most significant bits (see Kaplinsky; col. 11, lines 30-42).

Regarding claim 4, also inherent in the combination of Kaplinsky, Hopkins and Baumeister is a number of pixels whose most significant bits include zeros (logical zeros) are also counted since the too dark photodetectors/pixels in Kaplinsky inherently output low intensity values which correspond to logical zeros in the most significant bits in digital data due to an inherent proportion between intensity values and most significant bits, i.e., the lower intensity values, the more logical zeros presented in the most significant bits (see Kaplinsky; col. 11, lines 30-42).

Regarding claim 5, see the analysis in claim 4.

Regarding claim 7, Kaplinsky discloses that there are two different thresholds set by the user, one for too bright photodetectors and the other for too dark photodectors (col. 11, lines 34-38).

Regarding claim 8, Kaplinsky further implies in col. 11, lines 21-42 that the decision element reduces an exposure time for the overexposed image (too bright image) and increase exposure time for underexposure image (too dark image) since such operations are inherent in an automatic exposure device.

Regarding claim 11, Kaplinsky discloses a CCD sensor (col. 8, line 55) but Kaplinsky fails to teach an active pixel sensor with a plurality of pixels of CMOS image sensor, each pixel including an in-pixel buffer transistor and in-pixel selection transistor. However, an Official Notice is taken that such an active CMOS image sensor of an imaging device is well known in the art for a low driving voltage.

Therefore, it would have been obvious to those skilled in the art to implement the image sensor in Kaplinsky with an active CMOS image sensor having in-pixel buffer transistor and in-pixel selection transistor and driven with low voltages as an obvious variant over CCD image sensor in imaging technology.

Regarding claim 14, see the analysis in claims 1 & 2.

Regarding claim 15, the thresholds disclosed by Kaplinsky can be changed by the user (col. 11, lines 35-36). Therefore, the limitation of a memory (an inherent memory) storing the thresholds and the memory being variable to change the thresholds is also met.

Regarding claim 16, see the analysis in claims 1, 2 and 15.

Regarding claim 18, see the analysis in claim 3 and note that the two most significant bits must become 11 when highest intensity values are output from the "too bright" photodetectors.

Regarding claim 19, see the analysis in claim 4.

4. Claims 6, 22 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplinsky et al, Hopkins and Baumeister as applied to claims 2 & 16 and in further view of Van de Poel et al (US 6,061,091).

Regarding claim 6, the combination of Kaplinsky, Hopkins and Baumeister teaches the threshold detectors and the auto-exposure control as analyzed in claims 1 & 2 above. However, Kaplinsky, Hopkins and Baumeister do not suggest that the threshold detectors include values indicative of what percentage of the image can have underexposed or overexposed pixels and the exposure is controlled based on the percentages.

Van de Poel teaches an exposure control of an image sensor wherein the under-exposure and over-exposure of an image sensor may be detected based on a certain percentage (i.e., 25%) of pixels having low/high intensity values thereby an exposure control is established (see col. 8, lines 15-24).

Therefore, it would have been obvious to one of ordinary skill in the art to recognize that the threshold detectors in the combination of Kaplinsky, Hopkins and Baumeister would be

implemented in a manner that indicates a percentage of underexposed or overexposed pixels of exposure detection and control in view of Van de Poel as an obvious variation.

Regarding claim 22, Kaplinsky shows that the thresholds can be set by the user, meaning that the thresholds are variable (col. 11, lines 34-38). Therefore, it would have been obvious to one of ordinary skill in the art that the user would set the first threshold at about 30% of the total number of the pixels in the image sensor in an obvious setting configuration.

Regarding claim 23, Van de Poel shows that one threshold is set at about 25% of pixels so that the other threshold must be automatically set at about 75% of pixels in a 100% range (see col. 8, lines 15-24).

5. Claims 9, 10, 20 & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplinsky et al, Hopkins and Baumeister as applied to claim 2 and in further view of Yamaguchi (US 5,638,123).

Regarding claims 9 & 10, Kaplinsky teaches coincidence detectors and an inherent threshold storing element (see claim 15) and decoding circuit for controlling the integration time of the image sensor ranging from 0000-1011 (col. 11, lines 31-42). However, Kaplinsky does not specifically teach that each coincidence detector detects a different one of an overexposed image, an underexposed image, seriously underexposed image, and a seriously overexposed image, and the threshold storing element further storing first and second increase and decrease

increments, an underexposed or overexposed image being increased or decreased, respectively by the first increment, and the seriously underexposed or overexposed image being increased or decreased by the second increment.

Yamaguchi teaches an auto-exposure control device utilizing different detectors each detecting different one of a very bright image, slightly bright image, optimum image, slightly dark image and very dark image (Figs. 2-4). Yamaguchi further teaches increments for adjusting the shutter speeds of a camera. According to Yamaguchi, each increment is used for adjusting a suitable shutter speed, such as "very bright" corresponds to "shutter speed up to much degree", "slight bright" corresponds to "shutter speed up" and etc...(see Fig. 3). Specifically, there are two stored increments of absolute numeric values (i.e., +/- 5 and +/- 1), wherein the "very bright" and "very dark" fall within first increase and decrease increment of absolute numeric 5, which means the shutter speed is controlled by either adding numeric value 5 to or subtracting 5 from current shutter pulse data; and wherein the "slight bright" and "slight dark" fall within second increase and decrease increment of absolute numeric 1, which means the shutter speed is controlled by either adding numeric value 1 to or subtracting 1 from current shutter pulse data (see figs. 2 – 6; col. 7, line 58 – col. 8, line 27).

It would enhance an auto-exposure control of a camera by enabling the threshold storing element to store the first and second increase and decrease thresholds for controlling the corresponding exposure levels of an image since such technique provides "the exposure time T is shortened by a time five times greater than the shutter pulse period every field" and "making it possible to more finely vary the exposure time" as suggested by Yamaguchi in col. 11, lines 34-36 & col. 13, lines 30-31.

Therefore, it would have been obvious to one of ordinary skill in the art to combine Kaplinsky, Hopkins and Baumeister with the teaching of Yamaguchi to make the auto-exposure control processing more accurate by finely detecting exposure states of the image sensor and varying the exposure time with more than one increment value.

Regarding claims 20 & 21, see the analysis in claims 9 & 10.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaplinsky et al and Hopkins as applied to claim 1 and in view of Baumeister (US 4,684,995), Yamaguchi (US 5,638,123) and in further view of Van de Poel et al (US 6,061,091).

Regarding claim 12, see the analysis of claim 10 in section 5 and claims 6, 22 and 23 in section 4. Since the thresholds are variably set by the user in Kaplinsky and further Yamaguchi teaches seriously deficient image and less seriously deficient image while Van de Poel teaches detecting such deficient images using percentages. Therefore, it would have been obvious to one of ordinary skill in the art to combine Kaplinsky, Hopkins, Baumeister, Yamaguchi and Van de Poel to further improve the auto-exposure control by finely detecting exposure state of the image sensor and varying exposure time with more than one increment value, wherein the threshold for seriously deficient image (i.e., too bright image) and the threshold for less seriously deficient image (i.e., slight bright image) would be more than 100% as desired by the user.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (703) 605-4246. The examiner can normally be reached on Monday - Thursday, 8:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew B Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NT.

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